

目次

连拱隧道边坡变形的三维监测分析

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摘要 连拱隧道诱发的滑坡, 不但威胁着现场施工人员的安全, 还可能使隧道结构出现大量裂缝或者破坏, 甚至导致工程整体报废, 造成不可挽回的经济、社会损失。以云南元(江)磨(黑)高速公路小曼萨河隧道为例, 对隧道边坡变形进行三维监测及洞内变形监测, 确定该隧道边坡三维变形的基本模式。边坡变形的三维监测表明: (1) 边坡位移三维特征明显, 潜在滑面位于隧道以下; (2) 边坡向山外(Y正方向)方向的位移量最大, 主滑方向和隧道洞身斜交, 以向山外运动为主, 边坡测点总体的运动趋势为向隧道内部和山里转动。在隧道边坡治理中, 考虑隧道边坡主滑方向的三维变形特征, 取得良好的效果。对隧道边坡变形进行三维监测及洞内变形监测, 并将其用于隧道边坡的稳定性分析以及后期治理具有重要的理论意义和实用价值。

关键词 [隧道工程](#) [连拱隧道滑坡](#) [隧道边坡变形三维监测](#) [隧道边坡变形洞内监测](#) [隧道边坡治理措施](#)

分类号

3D MONITORING AND ANALYSIS OF LANDSLIDE DEFORMATION CAUSED BY TWIN-ARCH TUNNEL

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Abstract

Landslides caused by twin-arch tunnel not only threaten the safety of construction but also damage the integrity of tunnel linings and reduce tunnel life, even destroy the whole tunnel structure, which will induce large economic and social losses. Taking Xiaomansa River Tunnel along Yuanjiang—Mohei Expressway in Yunnan Province for example, 12 tunnel slope monitoring points and several monitoring items in tunnel are arranged. In the monitoring course, 3D deformation mode of the tunnel slope is determined through monitoring. Monitoring results indicate that (1) the deformation of tunnel slope presents 3D characters, and the slide face is under the tunnel and presented arch shape; and (2) the deformation in the outside direction of mountain(Y-direction) along tunnel is the maximum one, the primary deformation trend of the monitoring points is inside mountain and crossed with tunnel; and Y direction is the mainly sliding direction. 3D deformation monitoring results provide displacement mode of the tunnel slope, and is applied to the slope anti-slide design, which is significant for both stability analysis and control measurement of twin-arch tunnel slope.

Key words [tunnelling engineering](#) [landslide caused by twin-arch tunnel](#) [3D monitoring of tunnel slope deformation](#) [monitoring of slope deformation in twin-arch tunnel](#) [control measurement of landslide caused by twin-arch tunnel](#)

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